Energy Storage for Humboldt County

An essential ingredient in the local clean energy transition

July 23, 2025

REDWOOD COAST EnergyAuthority

Why an energy storage workshop? Why here? Why now? Why RCEA?

- Recent community discussions on energy storage
- Recent energy storage fire at Moss Landing – national attention
- RCEA's recent solicitation for energy storage
- RCEA's memorandum of understanding with City of Blue Lake seeking collaboration on energy storage

Meeting Agreements

- Respect different perspectives
- Stay on topic
- Engage productively

Agenda

- About Redwood Coast Energy Authority and community choice energy
- What is energy storage?
- Importance of energy storage in the clean energy transition
- Energy storage in California
- Energy storage in Humboldt County

Discussion Activity

- Safety and environmental concerns about batteries
- Codes and standards to advance battery safety
- What is RCEA doing to promote the safe use of battery storage?

Q&A with Expert Panel

Who is RCEA?

Local government Joint Powers Authority
Established 2003

Member agencies: Blue Lake Rancheria, Yurok Tribe, Humboldt Bay Municipal Water District, County of Humboldt and all seven incorporated cities

Mission to implement sustainable energy initiatives that:

- Reduce energy demand
- Increase energy efficiency
- Advance the use of clean, efficient and renewable resources

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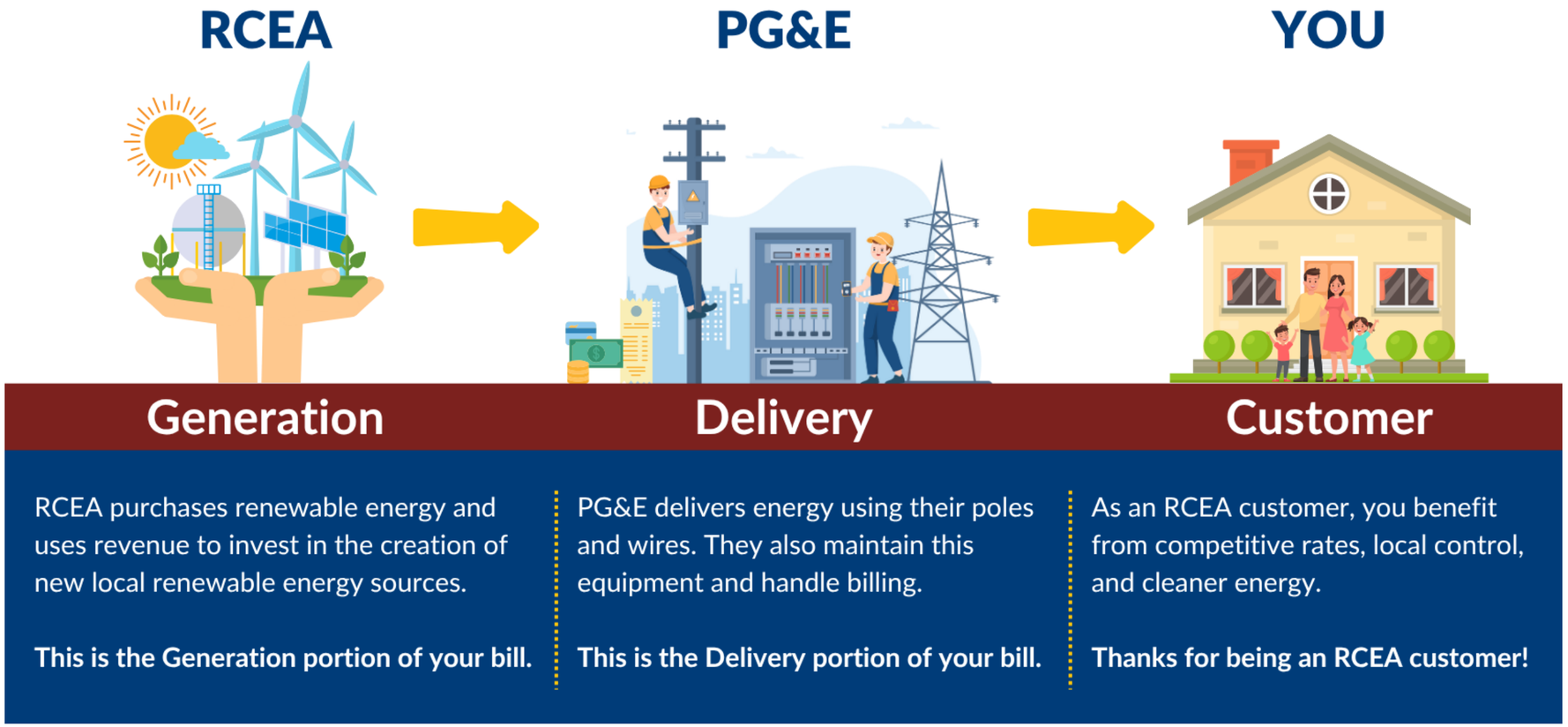
Community Choice Energy

- Launched in 2017
- Electricity provider for 92% of electric accounts in Humboldt
- Starting in 2025, RCEA is on target to provide a mix of 100% renewable resources and carbon-free resources to all customers



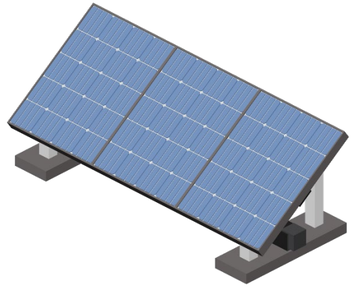
What is energy storage? How is it used?

Energy storage devices store electricity from generators, like wind or solar power systems, for later use

There are multiple reasons for installing and using energy storage:

- **Match the availability of solar and wind power** to times when consumers need energy
- **Provide local backup power** when there is a grid power outage
- **Maintain grid power quality** by stabilizing grid voltage and frequency
- **Avoid rolling blackouts** by providing capacity to serve grid at peak demand times
- **Generate revenue** through arbitrage – “buy low, sell high”

How can storage balance the grid?



Electricity Generation

Electricity generation can take place at different times of day. For example, solar energy is produced only in the daytime.

Electricity Consumption

Electricity consumption can also take place at different times of day. Grid operators need to match generation with consumption each minute of the day.

How can storage balance the grid?

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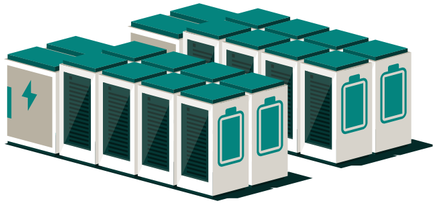
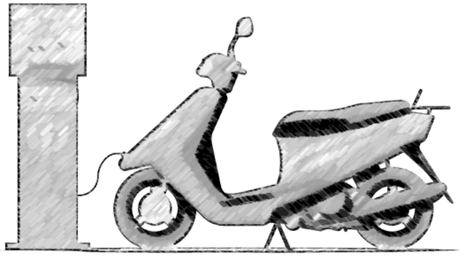


Energy Storage

Energy storage provides a way to match when electricity is available to when consumers need it by temporarily storing the energy in batteries or other devices.



Electricity Consumption

Electricity consumption can also take place at different times of day. Grid operators need to match generation with consumption each minute of the day.

Converting Between Electrical & Chemical Energy

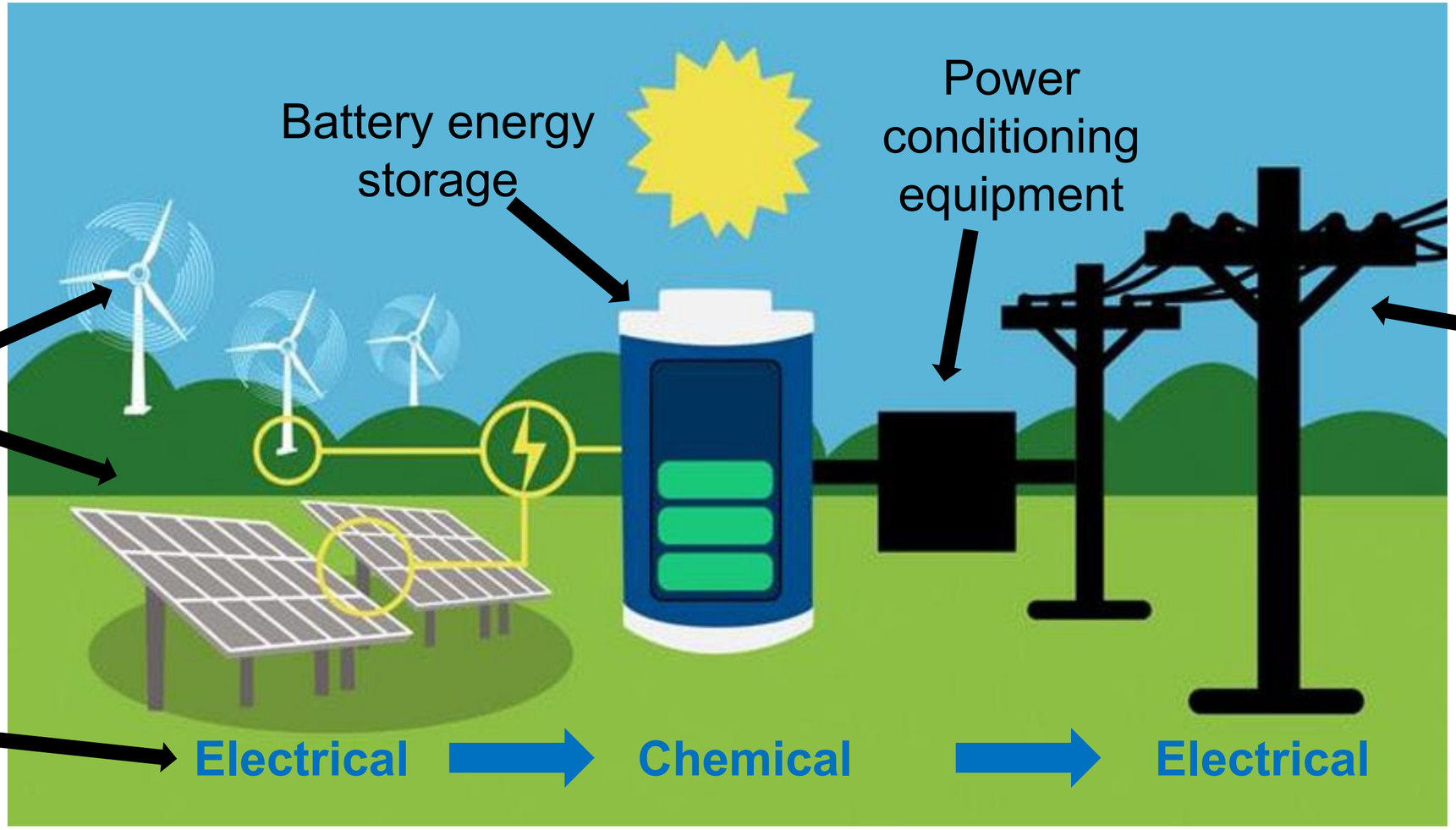


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Image source: technologynetworks.com

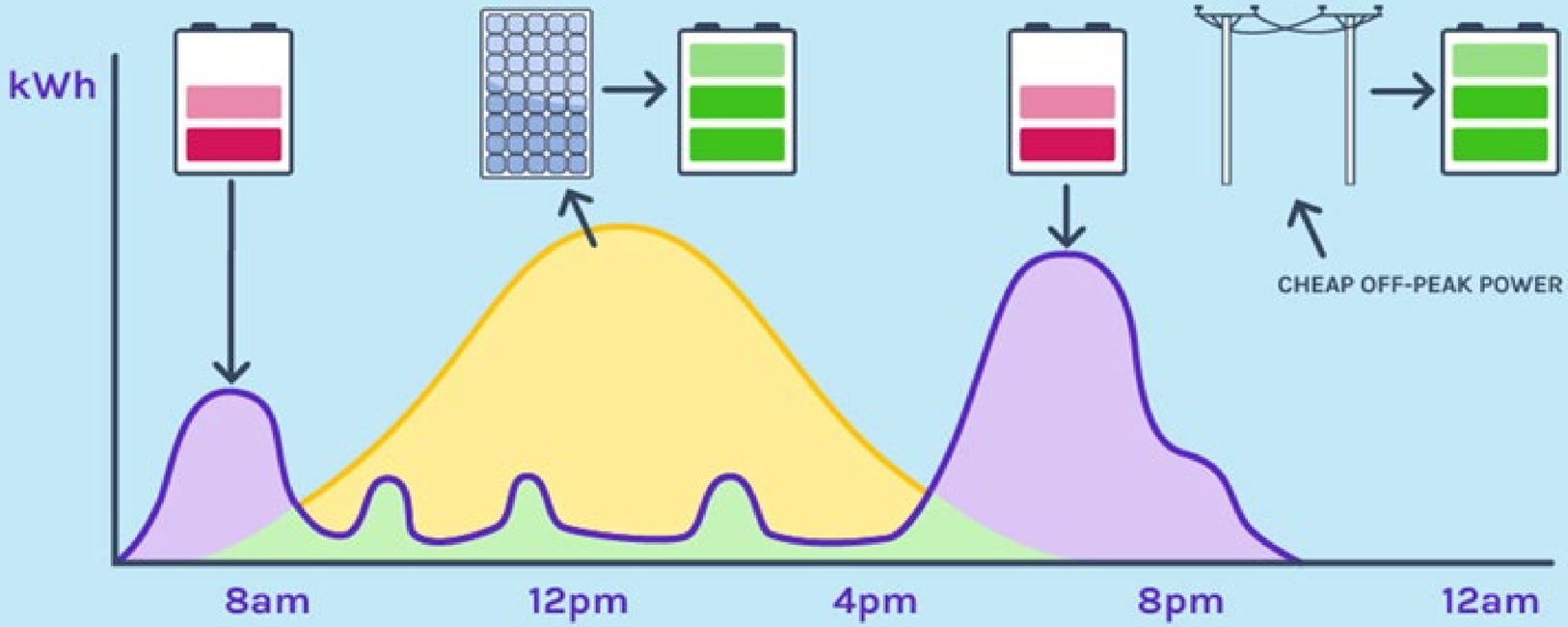
Energy Storage Enables Reliance on Clean Energy

Before sunrise: battery powers loads

Midday: solar powers loads and excess solar charges battery

After sunset: battery powers loads

Late at night: charge battery with cheap grid power



Key:
Typical Household Power Demand Solar Power Generated

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Source: https://www.mysolarquotes.co.nz/blog/solar-battery-information/how-a-solar-battery-charges-with-grid-power-/

What kinds of rechargeable batteries are available?

Conventional

- Lead-acid
- Nickel-based
- Lithium-ion
  - Lithium Cobalt Oxide ($LiCoO_2$) – LCO
  - Lithium Iron Phosphate ($LiFePO_4$) – LFP
  - Lithium Manganese Oxide ($LiMn_2O_4$) – LMO
  - Lithium Nickel Manganese Cobalt Oxide ($LiNiMnCoO_2$) – NMC
  - Lithium Nickel Cobalt Aluminum Oxide ($LiNiCoAlO_2$) – NCA
  - Lithium Titanate ($Li_4Ti_5O_{12}$) – LTO

Emerging/specialized

- Solid-state
- Sodium-ion
- Flow
- Zinc-based

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Conventional

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Predominant choice in recent storage projects

- Lithium Cobalt Oxide ($LiCoO_2$) – LCO
- Lithium Iron Phosphate ($LiFePO_4$) – LFP
- Lithium Manganese Oxide ($LiMn_2O_4$) – LMO
- Nickel Manganese Cobalt Oxide ($LiNiMnCoO_2$) – NMC
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- Lithium Titanate ($Li_4Ti_5O_{12}$) – LTO

Used in many earlier projects, including Moss Landing

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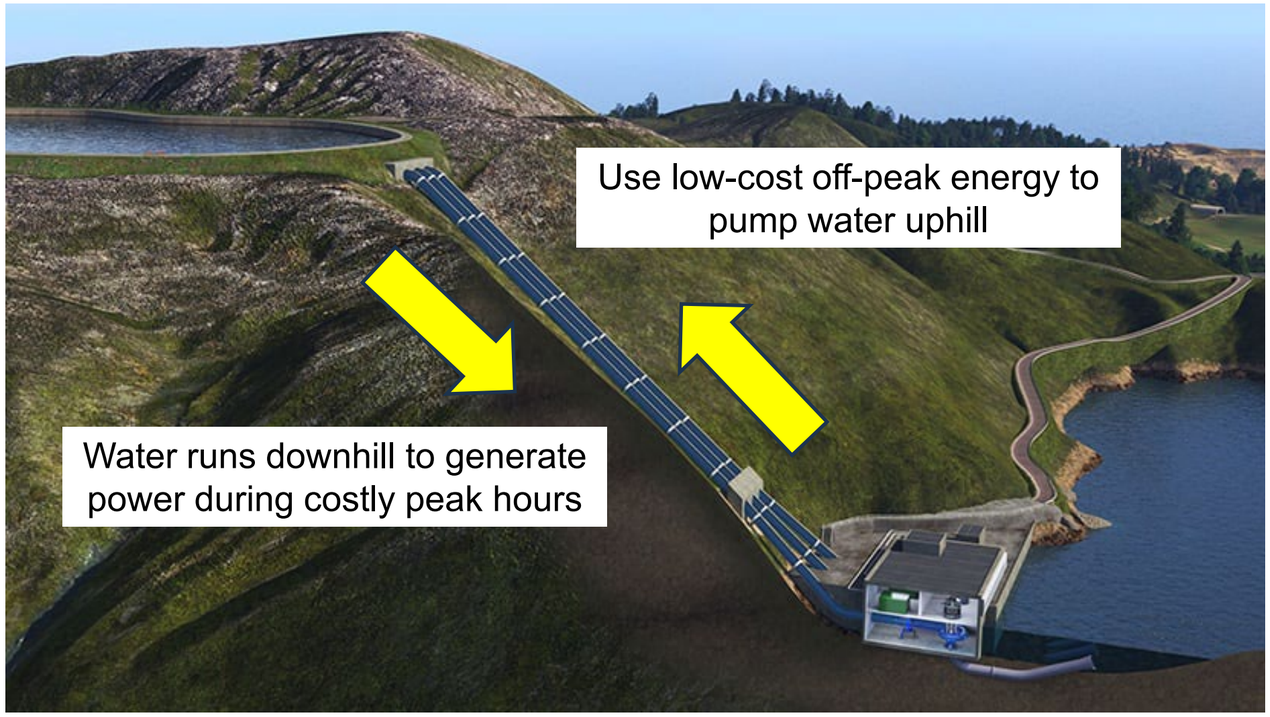
What other storage options are out there?

- Gravity-based – pumped hydro, or raising and lowering weights
- Hydrogen – using electrolyzers and fuel cells
- Compressed air
- Ultracapacitors
- Thermal storage
- Flywheels

Pumped Hydro Storage



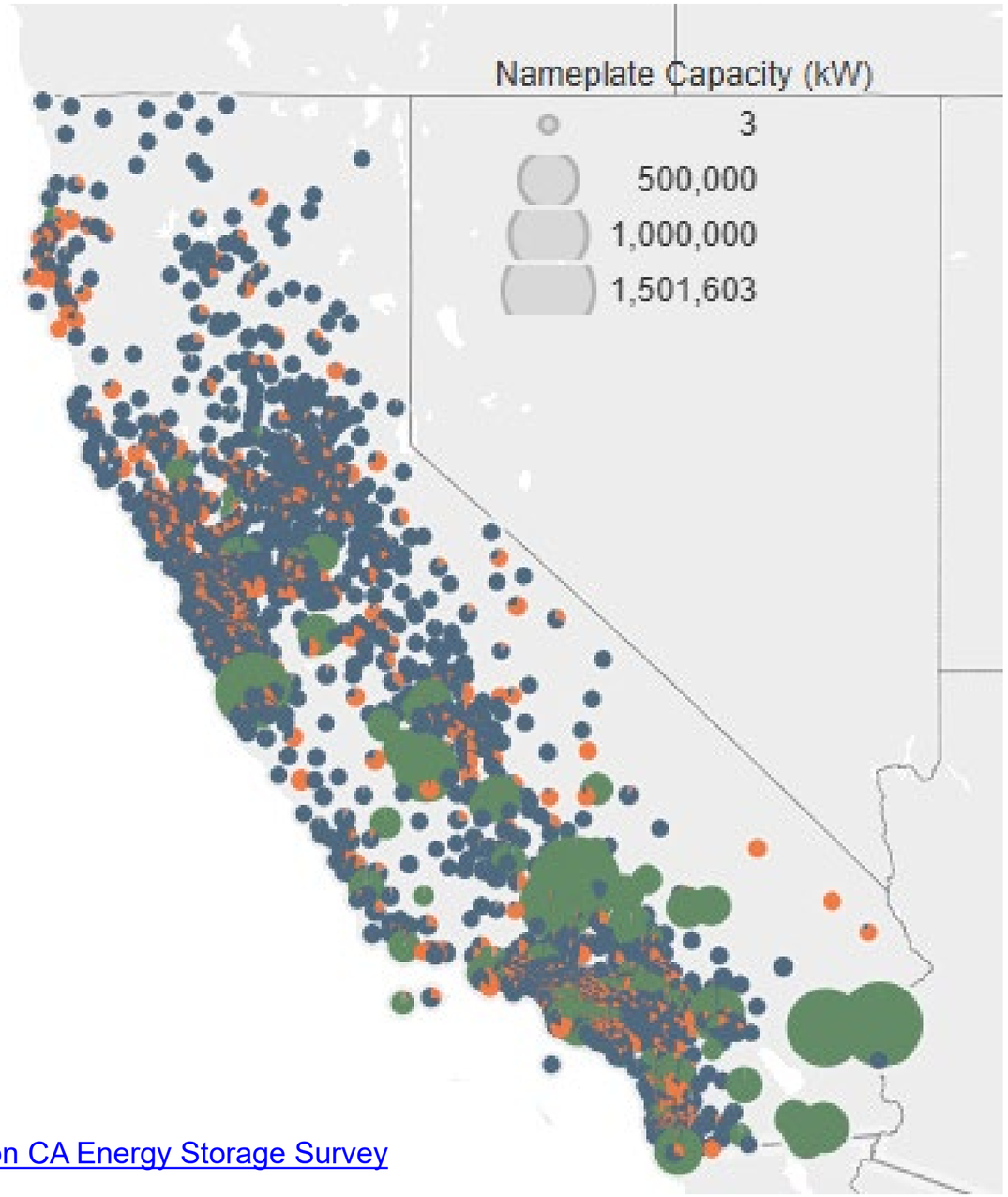
California Battery Energy Storage

as of end of 2024 = 13,391 MW

Sector

- Residential
- Commercial
- Utility

Installed storage capacity by ZIP code



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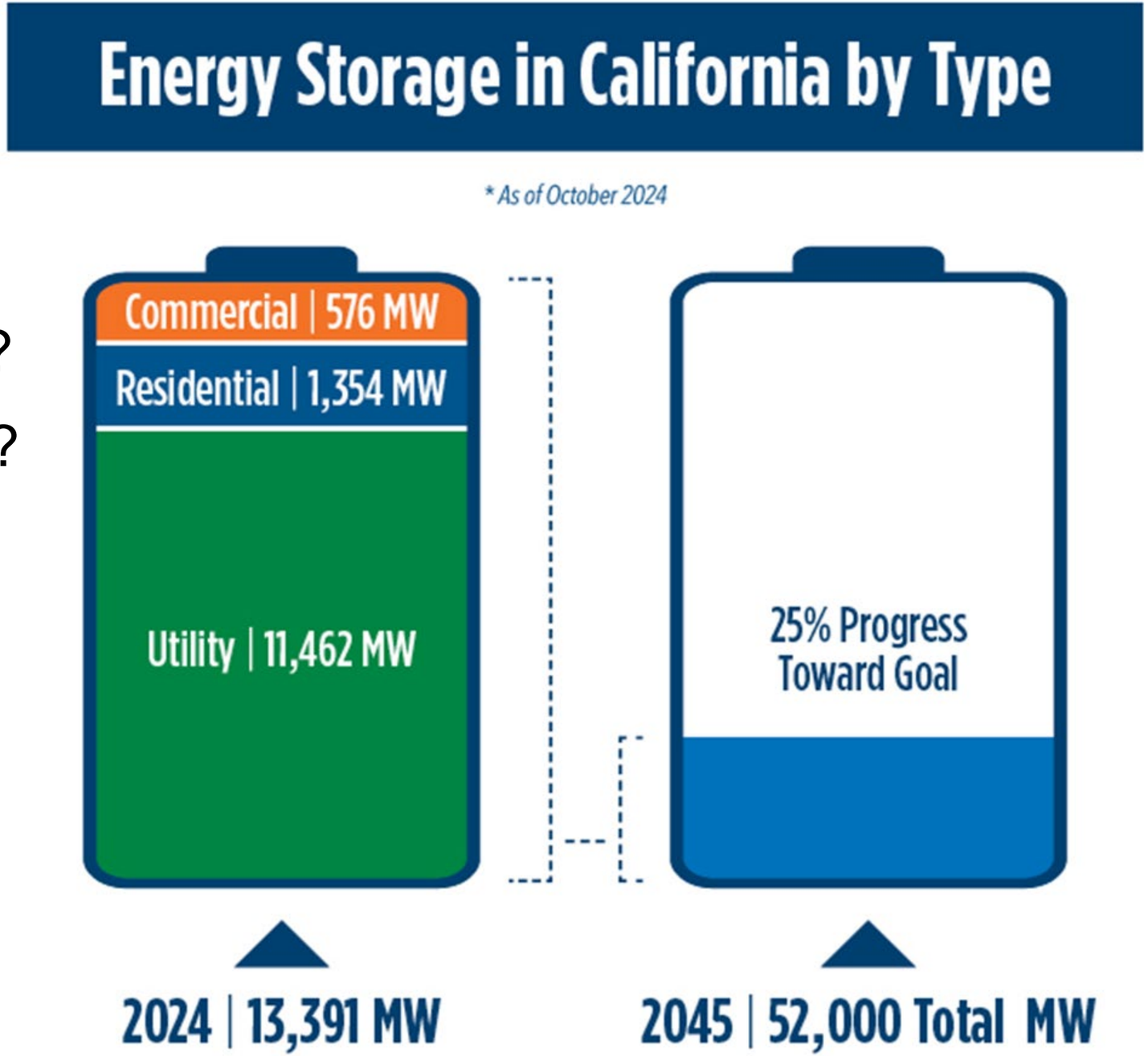
Source: California Energy Commission CA Energy Storage Survey

- How much energy storage does California policy call for?
- How close are we to the goal?
- How much of the capacity to date is centralized ("utility") vs. decentralized?



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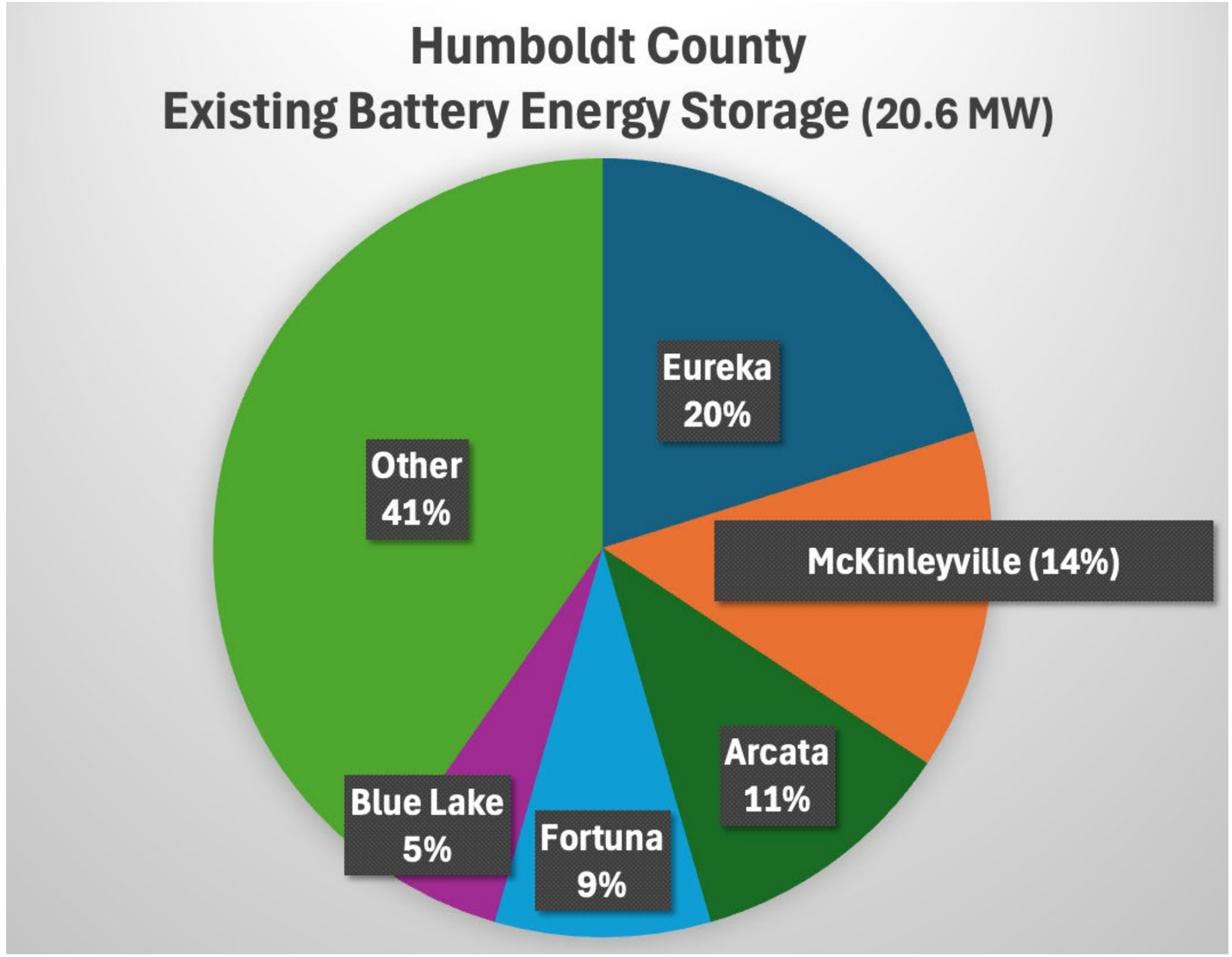
Humboldt County Battery Energy Storage

as of end of 2024

- 60% Commercial
- 31% Residential
- 8% Utility (RCEA Redwood Coast Airport Microgrid)

Note: All Li-ion batteries.



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Source: California Energy Commission CA Energy Storage Survey

Energy Storage in Humboldt: Utility-Scale Projects

Redwood Coast Airport Microgrid

Battery capacity = 2.2 MW/8.9 MWh

Foster Solar + Storage, Arcata, currently nearing completion

Battery capacity = 2.5 MW/10 MWh

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Local Energy Storage: Distributed Projects

RCEA has recently supported:

- Community Grid Program that enrolled 54 customers who installed storage systems totaling 730 kWh, forming a virtual power plant that could be centrally dispatched to improve grid resilience and reliability
- Solar + battery systems at 16 remote fire stations and an emergency communications tower, total battery capacity = 863 kWh
- Feasibility studies, technical assistance and funding secured for projects that may provide over 2,600 kWh of additional storage for Tribal senior housing and public facilities

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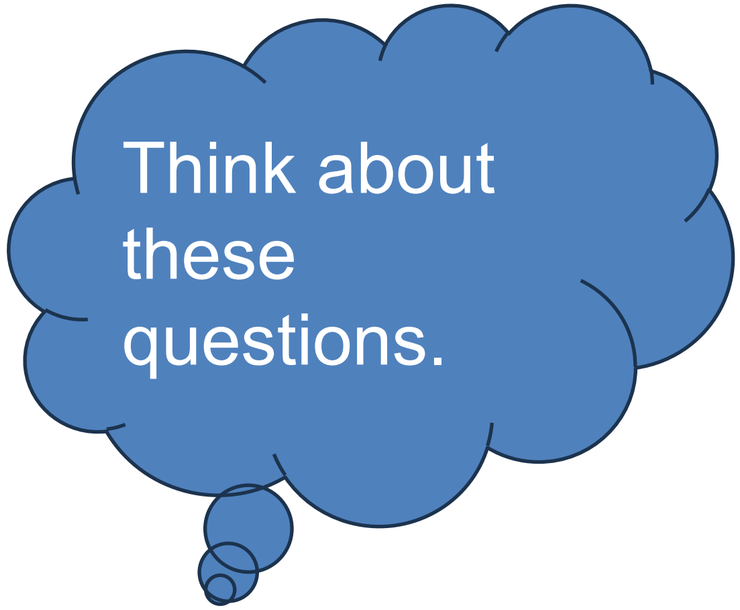
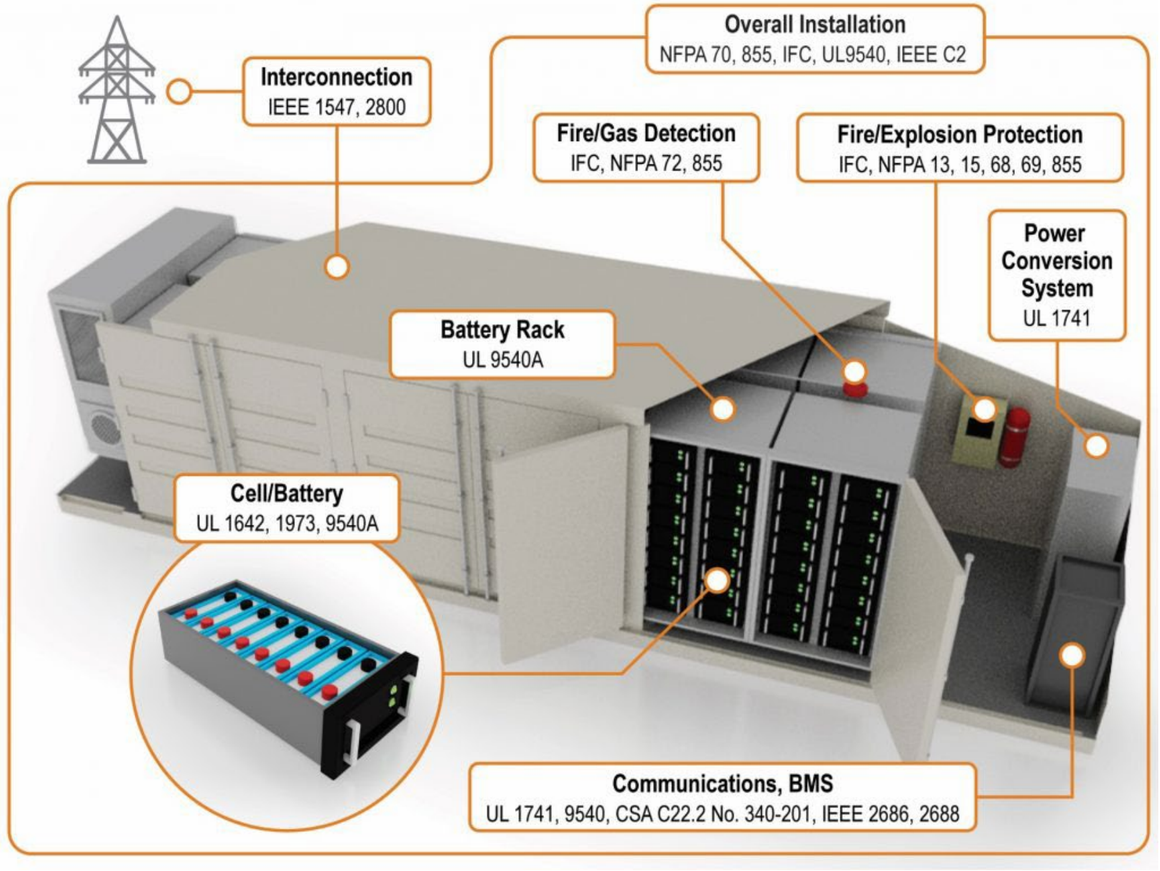
Discussion Activity

- How would you like to see energy storage used in Humboldt County?
- What concerns do you have about energy storage?
- How do you think these concerns should be addressed during planning or implementation of projects?



Fire Safety and Related Environmental Concerns About Batteries

- Because lithium batteries store a lot of energy in a small space, there are risks of fire if the batteries are damaged.
- Understanding and managing these risks is an important part of developing battery projects.
- Codes and standards now in place can guide this important work.



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Source: https://www.sandia.gov/energystoragesafety/codes-and-standards/

Fire Safety and Related Environmental Concerns About Batteries

- As an early adopter, some facilities in California were designed and permitted before the creation of national product and installation standards.
- The **National Fire Protection Association (NFPA) issued its first 855 standard in 2020**, which is updated every three years.
  - California Fire Code lags NFPA by three years – updates this summer will adopt the 2023 code.
- **UL 9540 standard added a burn testing requirement in 2022**.
  - Products must show that thermal runaway will not propagate beyond a single unit (cell, module, rack or container).
- **The LFP chemistries now dominant are more stable than NMC chemistries used in earlier projects.**

Current Fire Safety Standards

Current Fire Standard: NFPA 855

- Released 4/1/2020, Updated 8/25/2023
- Standard dictates testing, fire walls, minimum spacing between units, site-specific hazard mitigations, and emergency response planning.
- Each container has dedicated HVAC unit, smoke, gas and fire alarms, fire suppression systems, and automatic shut-off controls.
- Factory testing ensures containers can suppress fires and prevent igniting adjacent units.

Battery Chemistry and Installation Practices

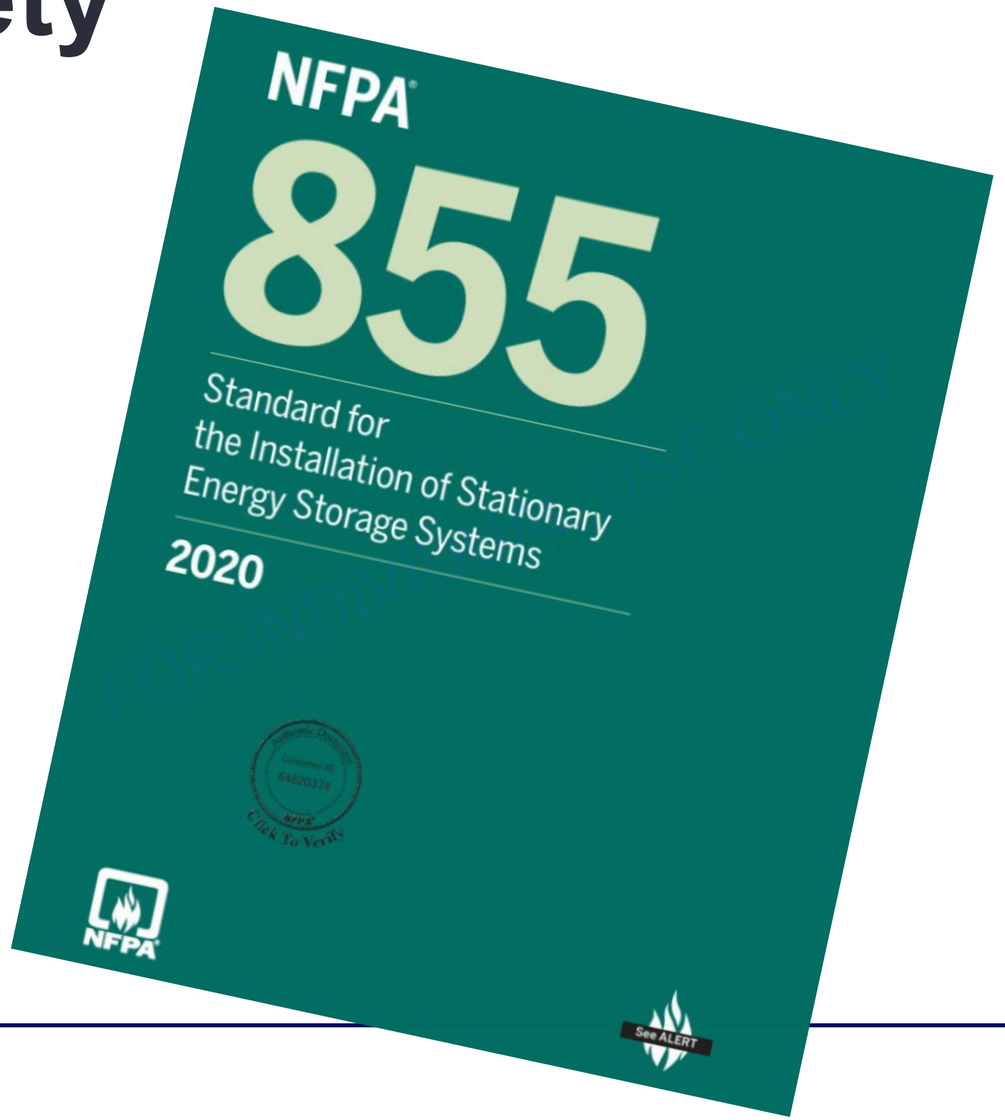
- Lithium Iron Phosphate (LFP) is the most common chemistry today, and is generally considered to be more stable, i.e. less prone to thermal runaway.
- Most large installations are located outdoors with appropriate setbacks.

Henrietta D Energy Storage Project in Kings County, CA

Source: https://avaenergy.org/wp-content/uploads/2024/07/Convergent_s_10_MW_Project_in_Partnership_with_EBCE_q6k0zu.jpg

How much of the battery capacity in California meets current safety standards?

Greater than 94% of all utility scale battery capacity came online in 2021 or later, after the initial NFPA 855 standards were released, and should be code compliant.



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Source: California Energy Commission CA Energy Storage Survey

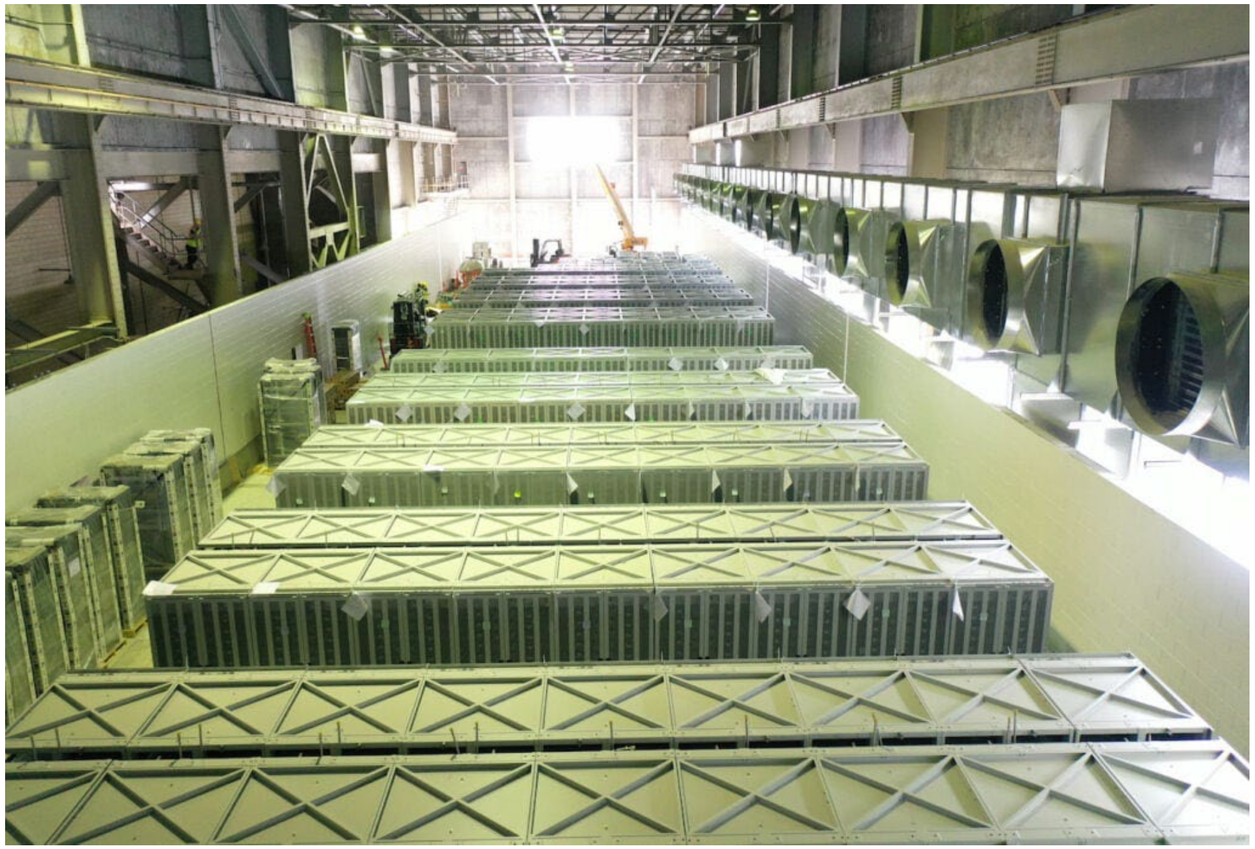
Public Health/Environmental Impacts

- When lithium-ion batteries burn or overheat, they produce several pollutants of potential concern.
  - Toxic gases: carbon monoxide (CO), hydrogen fluoride (HF), hydrogen chloride (HCI), and hydrogen cyanide (HCN)
  - Particulate matter (PM)
  - Metals (e.g., cobalt, manganese, nickel)
  - Hydrofluoric acid
- If there is a fire, risks associated with smoke or toxic gas inhalation and with environmental contamination must be managed. Emergency first responders and others who respond must be trained to address these risks.

Moss Landing Battery Fire – What Happened?

Moss Landing was a non-standard design:

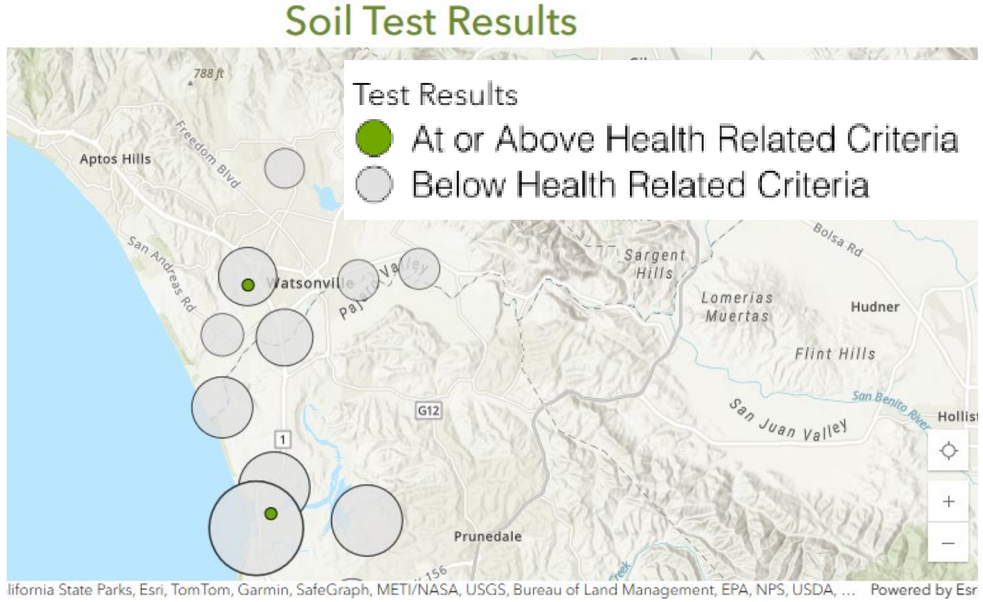
- Phase I was built indoors, as one large 300 MW battery
- Minimal fire barriers between cells/modules
- Battery chemistry: Lithium Nickel Manganese Cobalt Oxide (NMC), generally considered more prone to thermal runaway
- Phase I was constructed before NFPA 855 established standards for battery storage design and installation.
- The non-standard design, and emergency response standards, allowed the fire to propagate through the entire building.



Interior of Moss Landing BESS Phase I

Source: https://www.energy-storage.news/moss-landing-worlds-biggest-battery-storage-project-is-now-3gwh-capacity/

Moss Landing – Assessing the Public Health and Environmental Impacts



- Testing and monitoring has been performed on potential contamination of soil, air, and water on and near the site
- The Monterey County health department created a public GIS dashboard to present collected data
- Data has been shared from sources including US EPA, California Department of Toxic Substances Control, County Environmental Health and other agencies. Never Again Moss Landing, a grassroots community group, has also participated, advocating for transparency and disclosure

For more info, visit this site set up by the County of Monterey:
https://www.readymontereycounty.org/emergency/2025-moss-landing-vistra-power-plant-fire/testing

What is the state of California doing to ensure energy storage is used safely?

- The Governor's Office of Business and Economic Development coordinates a State Battery Storage Safety Collaborative
- On July 24, CAL FIRE is hosting a symposium on battery safety for local officials including fire departments. Online participation available.

CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION
CAL FIRE
SINCE 1885

CALIFORNIA
BUSINESS AND ECONOMIC DEVELOPMENT

For more information on the collaborative and the symposium, see:
https://business.ca.gov/industries/climate-and-clean-energy/state-battery-storage-safety-collaborative/

What are RCEA and local authorities doing to ensure energy storage is used safely?

- RCEA's recent energy storage solicitation included safety as an evaluation criterion.
- RCEA's contracts for energy storage will call for projects to include safety plans, including emergency response plans.
- Most importantly, the authority having jurisdiction where the projects are built (i.e., county or city building departments) will require the projects to meet all applicable safety codes and standards.

THANK YOU

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Energy Storage and the Los Angeles Wildfires

Perspectives from Supervisor Natalie Arroyo

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EPA Emergency Response Fact Sheets

Los Angeles Wildfires

Lithium-ion batteries burned by wildfires

The U.S. Environmental Protection Agency (EPA) has been assigned by the Federal Emergency Management Agency (FEMA) to remove lithium-ion batteries affected by the Los Angeles County wildfires.

This includes battery:

- recovery
- safe transportation
- processing (de-energizing)
- safe disposal

⚠ Use extreme caution when returning to your property ⚠

Your home may have damaged or destroyed lithium-ion batteries, lithium-ion battery energy storage systems, and electric and hybrid vehicles.

- ✓ **The batteries should be considered extremely dangerous**, even if they look intact.
- ✓ **Lithium-ion batteries can spontaneously re-ignite, explode, and emit toxic gases and particulates even after the fire is out.**

Household Items with Lithium-Ion Batteries:

Other examples:

- Electric/hybrid vehicles
- Electric bikes
- Hoverboards
- Wheelchairs
- Digital cameras
- Home alarms
- Power banks or stations
- Game controllers
- Home energy storage systems
- Personal mobility device
- Scooters
- Drones
- Tablets
- Power tools
- Vaping devices

If you hear a popping, hissing noise, or see smoke or fire:

1. Do not attempt to extinguish or smother the battery.
2. Leave the area immediately.
3. Move upwind at least 330 ft (the length of a football field) and **call 911**.

- **Do not** touch fire-damaged products with lithium-ion batteries – they can ignite.
- **Do not** start, move, tow, or charge a fire-damaged electric/hybrid vehicles (EV, PHEV, HEV). These will be assessed by EPA hazardous material professionals.
- **Do not** use or start a fire-damaged residential energy storage or house battery. These will be assessed by EPA hazardous material professionals.
- **Do not** enter enclosed spaces with lithium-ion battery products.
  - Gasses and vapors from damaged lithium-ion batteries can build up in enclosed spaces (such as a garage, shed, basement, or closet) and may produce an explosive environment.

- **DO** call our hotline if you encounter a lithium-ion battery while re-entering your property and/or are unsure if a lithium-ion battery was damaged.

epa.gov/california-wildfires

For questions about this work or **if you have an electric or hybrid vehicle and/or a battery energy storage system in the burn zone**, call the EPA hotline at:

1-833-R9-USEPA
(1-833-798-7372)

EPA Emergency Response Fact Sheets

THE ROAD TO DISPOSAL
Los Angeles Wildfires

Eaton and Palisades Fire Staging Areas

The U.S. Environmental Protection Agency (EPA) and the Department of Toxic Substances Control (DTSC) are assessing and removing household hazardous materials (HHM) from properties affected by the Eaton and Palisades fires as a part of Phase 1.

EPA collects household hazardous materials from burn areas and brings them to controlled environments called staging areas. Once there, EPA safely packages and transports these materials to proper disposal facilities.

Empty canisters are marked and collected in front of cleared properties to be picked up at a later date

Four temporary staging areas have been set up to safely sort and package these materials.

HHM is sorted into similar materials streams at staging areas

Eaton Fire Staging Areas:

- 15701 West Foothill Blvd. in Azusa (Larlo)
- 1456 East Mendocino St. in Altadena (Altadena Driving Range)

Palisades Fire Staging Areas:

- Intersection of Pacific Coast Highway and Temescal Canyon Rd (Will Rogers State Beach Parking Lot)
- Intersection of Pacific Coast Highway and Topanga Canyon Blvd. (Topanga)

Materials like paint, aerosols, oils, batteries, pesticides, cleaners and solvents are collected and packaged from properties.

The area will be left as we found it.

See the flip side of this fact sheet for detailed information on safety and process.

Handling lithium-ion batteries:

- Lithium-ion batteries are a unique high-hazard material that EPA is safely removing from burned electric and hybrid vehicles and properties.
- Trained crews use heavy machinery to remove the tops of burned vehicles and flip them over to expose their battery packs. Workers shovel the batteries from the vehicles into metal drums for safe shipment to a temporary staging area.
- Larger energy storage batteries (with fire-damaged cases) are checked by an electrician and wrapped for safe transport to a specialized part of the HHM staging areas.
- At the staging area, lithium-ion batteries are de-energized in saline solution. Then, batteries are either:
  - flattened by drum rollers in contained, lined areas, or
  - shredded directly into steel barrels.
- At this point, the de-energized, flattened batteries no longer hold a charge and can be shipped offsite for disposal.

A. An excavator opens the battery pack on an electric vehicle
B. Crews contain batteries in lined drums for safe transport to staging areas
C. Crews mark electric vehicles with white lightning bolts once the batteries are removed

FOR QUESTIONS ABOUT EPA'S PHASE 1 WORK:

Visit our EPA website: **epa.gov/california-wildfires**
Contact our hotline: **1-833-R9-USEPA (1-833-798-7372)**
Email: **EPALAWildfiresInfo@epa.gov**

HAVE HEALTH QUESTIONS?

Visit the L.A. Department of Public Health website at **publichealth.lacounty.gov/media/Wildfire** or **833-540-0473**

EPA Emergency Response Fact Sheets